Wildlife, Hydrology, and Engineering Technical (WHET) Committee Recommendations

Decision Point #1: Large Crossing Structure Types, Sizes, and Locations from MP 62 to MP 70

Introduction

This report is intentional in only looking at how the larger structures (such as bridges and wildlife overcrossings) within the remaining area of the I-90 Snoqualmie Pass East Project (MP 62 to MP 70) can meet the high mobility wildlife connectivity objectives found in the 2008 Final Environmental Impact Statement (EIS).

Large structures include wildlife overcrossings (with unlimited openness) and bridge spans that provide a wildlife passage that is 12 feet high over typical snow depth [i.e. 16 feet] and 100 feet wide (MDT pg 2-46).

This report documents the recommendations of the Wildlife, Hydrology, and Engineering Technical (WHET) Committee, which was formed as an advisory group to the I-90 Interdisciplinary Team (IDT), reviewing and updating the type, size, and location of the large wildlife crossing structures within the framework of the surrounding landscape. These recommendations allow WSDOT to proceed with preliminary highway designs with more detail and certainty. We also considered and made a recommendation on the highway alignment configuration at Easton Hill because it has a bearing on our wildlife connectivity objectives for the remainder of the project.

Who participated in the Committee?

The Committee consisted of members of the I-90 Project Interdisciplinary Team (IDT) with expertise in wildlife, ecological connectivity and WSDOT engineers and environmental staff. **Exhibit 1** provides a list of participating members.

The WHET Committee convened for three, day-long meetings in April and May 2015, and participated in a final field tour in June.

Exhibit 1. Wildlife, Hydrology, and Engineering Technical Committee Members

Name	Agency	Name	Agency
Bill Ehinger [1]	USFS	Bill Sauriol	WSDOT
Patty Garvey-Darda [1]	USFS	Luke Huck	WSDOT
Karl Halupka [1]	USFWS	Mark Norman	WSDOT
Brent Renfrow	WDFW	Mark Reynolds	WSDOT
Julie Heilman-Suarez	WSDOT	Josh Zylstra	WSDOT

1- MDT Member

Members of the Committee that also participated in the Mitigation Development Team (MDT) are identified in **Exhibit 1**. They provided an important link to the significant efforts leading to the MDT Recommendation Package in 2006; a document that establishes many of the ecological connectivity standards, goals, and objectives that are integral to the project.

Why is it necessary to update the remaining project area design?

Through spring of 2015, available funding allowed WSDOT to develop and finalize designs for all of Phase 1 and Phase 2A, from milepost (MP) 55 to 62. Construction of these phases is underway.

Additional funding was recently allocated to design and construct the remaining project area, from MP 62 to 70. As a first step, WSDOT reviewed the preliminary designs from the Selected Alternative found in the 2008 Final EIS for the remaining project area to assess the constructability and practicality of the project preliminary designs. This initial effort showed that there were challenges in meeting the bridge heights and locations found in the Final EIS.

What we did not address in this report?

This planning effort was focused on large structures that meet high-mobility wildlife objectives found in the 2008 Final EIS. Our recommendations on large structures allow WSDOT to proceed forward and refine additional design elements related to cut and fill lines, stormwater, culverts, smaller creek crossings, Hydrologic Connectivity Zones (HCZs), and wetlands. In addition, our recommendations on the large structures do not address other regulatory requirements on avoidance, minimization or conservation measures related to the U.S. Forest Services or U.S. Corps of Engineers guidance. These steps will be discussed and documented with the IDT when additional design information is available.

Why focus on large structures?

Updating plans for large helps ensure expectations for high-mobility wildlife connectivity can be met and allows WSDOT to move forward with additional geotechnical and design studies.

How did the Committee develop and evaluate design options?

In preparation for our first meeting, WSDOT designers incorporated the large structures identified in the Selected Alternative into a working design to determine achievable vertical clearances and identify other constraints or considerations. From this starting point, the committee reviewed and refined the large structure options at each of our meetings to determine whether they were functionally equivalent to the Selected Alternative.

Our decision making process was predicated on the following standards established by the MDT:

- The MDT Recommendation Package (WSDOT 2006) remains the best available science on which to base project decisions.
- The large structures included in the Selected Alternative design met the MDT objectives on a project-wide basis and were vetted through the NEPA process.
- The large structures selected by the committee must be "functionally equivalent" to those in the Selected Alternative design and meet the objectives and performance standards for ecological connectivity structures.
- Each Connectivity Emphases Area (CEA) represents a unique assemblage of habitats and species; therefore, insufficient connectivity in one habitat linkage zone cannot be compensated for by additional connectivity structures in other zones.

The distribution of large crossing structures is constrained by topography, existing infrastructure, and other considerations. Thus, a **project-wide** analysis is necessary to determine whether linkage zones and habitat types are adequately connected across the landscape.

How was "functionally equivalent" defined?

Functional equivalence means the proposed structures must meet the MDT ecological connectivity **objectives and performance standards**. At a coarse scale, we thought it was important to maintain the overall length of the bridges and the total number of **large structure equivalents** within each CEA, or within CEAs in the same **linkage zone** found in the Final EIS. We quantified large-

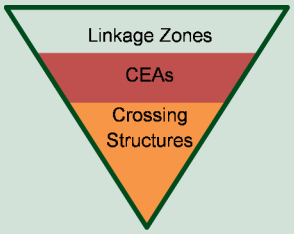
Large Structure Equivalents are contiguous units of 100 feet of bridge.

Using this system, a 200-foot bridge equals two large structures; however, to meet the contiguous criteria, two 150-foot bridges would equal two large structures, not three.

structure equivalents in contiguous units of 100 feet of bridge.

Example: In the Final EIS the Swamp and Toll Creek CEAs included four 120-foot bridges in the same linkage zone for a total of 480 feet of bridge length. Our recommendation for these CEAs consists of two 200-foot bridges and one 80-foot bridge for a total of 480 total feet of bridge. Both of these examples provide four large structure equivalents with a total of 480 feet of bridge length. The 80-foot bridge at Swamp Creek is considered a medium structure, but is counted in the total bridge length. Additional details on the rational of our recommendations can be found in the detailed CEA sections below.

Linkage Zones
Ecological connectivity is considered at multiple scales. There are several identified Linkage Zones in the project area. These consist of one or more CEAs, which include one or more Crossing Structures.



After this coarse assessment, we took into account both opportunities and constraints of the surrounding landscape near I-90. Factors we considered included:

- Existing road profile and adjacent topography – influence structure type (an under or over crossing) and the practically of achieving the desired vertical clearance beneath the structure.

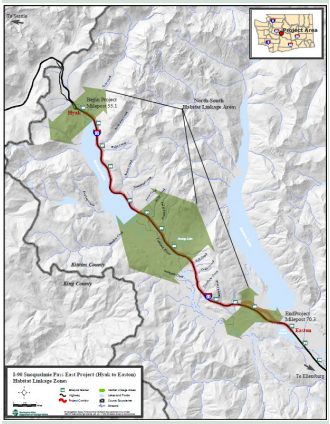
- Proximity to interchanges – constrain the vertical clearance under nearby highway structures and effect work and resource impacts on connector roads, including the highway on-ramps and off-ramps. Changes in the profile (elevation) of the interchange can also increase nearby highway bridge widths (across the lanes), decreasing openness.

- Wildlife Habitat – Proximity to habitats (mature forest, wetlands, talus, etc.) and wildlife corridors targeted for ecological connectivity.

- Human Use – Proximity of wildlife structures next to known recreational areas can reduce the effectiveness of the wildlife crossing structures.

- Surrounding land ownership – Private property and incompatible land use can reduce the effectiveness of the wildlife crossing structures, particularly large structures, that are important to our wildlife connectivity investments.

Linkage Zones from the FEIS



- New science (literature or monitoring/research studies from I-90 or other areas). For example, studies suggest elk are less unlikely to use undercrossings.

What are the Committee's recommendations?

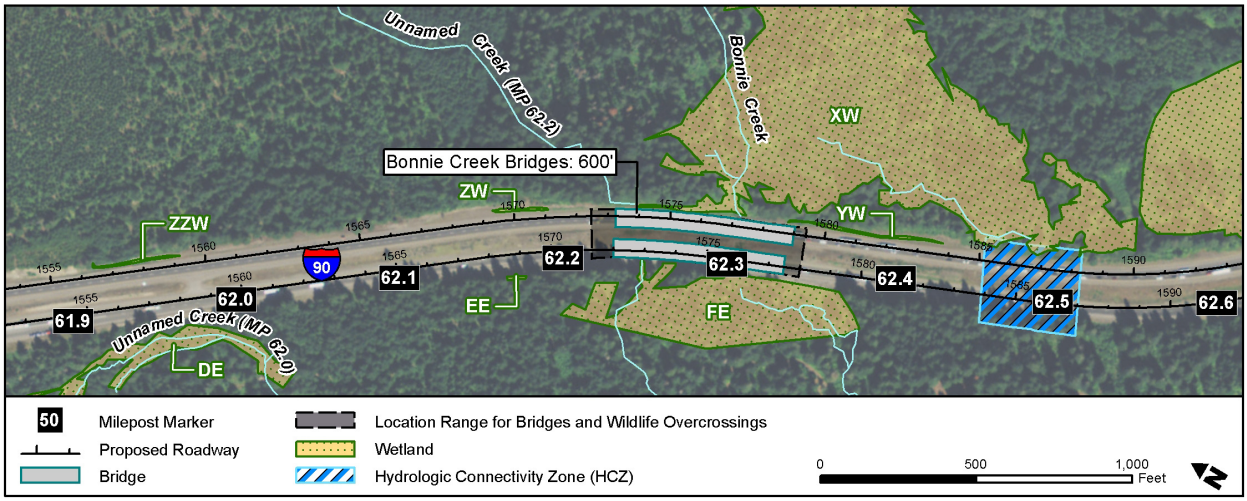
We developed recommendations on the large structures within each of the CEAs and for the lane configuration at Easton Hill. **Exhibit 2** summarizes the WHET Committee recommendations and the following section describes them in more detail.

Exhibit 2. Recommended Structures by Connectivity Emphasis Area

CEA	Milepost	Selected Alternative - Original Design	WHET Committee Recommended Design
Bonnie Creek	62.3	600' Bridges	600' Bridges
Swamp Creek	62.5	120' Bridges	200' Bridges
	62.7	120' Bridges	80' Bridges
	63.2	120' Bridges	No large structure
Toll Creek	63.7	120' Bridges	200' Bridges
Hudson Creek	67.1	230' bridges	230' Bridges
Easton Hill	67.6	120' Bridges	150' Overcrossing
Kachess River	67.6 to 69.4	Retain split alignments	Bundle alignments
	68.6 vicinity	150' Overcrossings (68.5 WB/ 68.7 WB)	150' Overcrossing

Recommendations by CEA

Bonnie Creek CEA



Bonnie Creek CEA is located between MP 61.9 and 62.5, and includes opportunities to reconnect high value habitats on either side of the highway including mature forest and high-quality forest wetlands. The Selected Alternative design included eastbound (EB) and westbound (WB) 600 foot bridges at MP 62.3, spanning Bonnie Creek and an unnamed creek, with at least 16 feet of vertical clearance.

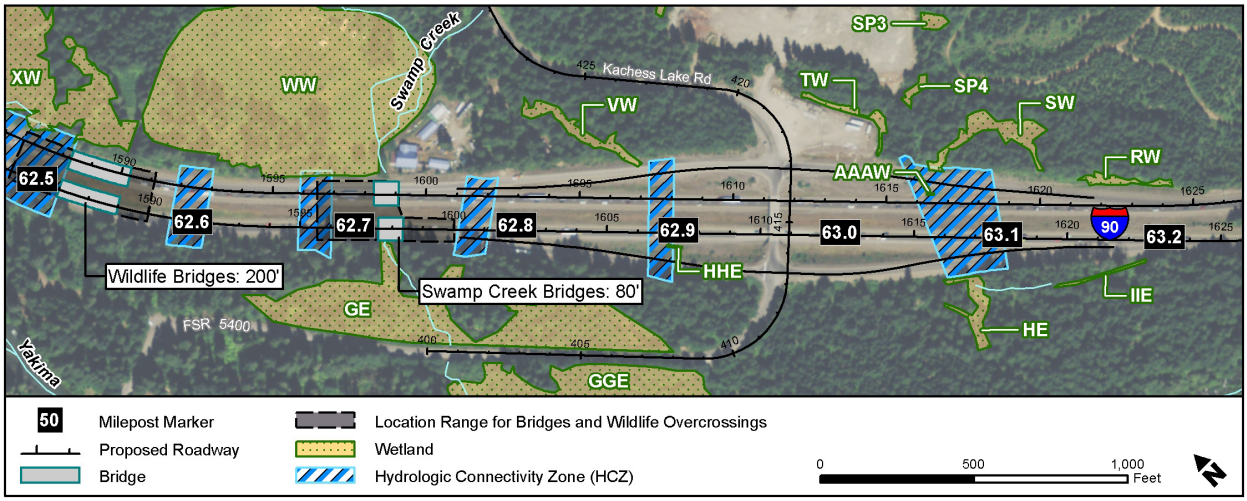
Recommendation

Our recommendation for the Bonnie Creek CEA matches the Selected Alternative: construct EB and WB 600 foot bridges at MP 62.3, spanning Bonnie Creek and an unnamed creek with 13 to 16 feet of vertical clearance.

Rationale

We did not identify any constraints that would require changes to the structure type, size, or location at Bonnie Creek CEA. We will continue to work to maximize vertical clearances under the bridge as designs progress.

Swamp Creek CEA



Swamp Creek CEA is located between MP 62.5 and MP 63.4, and has the potential to provide important linkages between unique wetland/marsh habitats. The Selected Alternative included EB and WB 120 foot bridges at MP 62.5, Swamp Creek (MP 62.7), and MP 63.2, with at least 16 feet of vertical clearance.

Recommendation

Our recommendation for Swamp Creek includes modifications to the Selected Alternative:

- For the unnamed creek at MP 62.5, increase the bridge lengths to 200 feet with 13 to 16 feet of vertical clearance. We will continue to work to maximize vertical clearances under the bridge as designs progress.

- For Swamp Creek, decrease the bridge length to 80 feet with 10 to 12 feet of vertical clearance due to its proximity to the Stampede Pass Interchange and incompatible land use north of the highway.

- Remove the 120 foot bridge at unnamed creek at MP 63.2 due to its proximity to the Stampede Pass Interchange and expected low vertical clearance. We will continue to explore opportunities with WSDOT to restore Swamp Creek to its historic channel

south of I-90 by shifting EB and WB bridge locations to best fit historic conditions.

Rationale

The Stampede Pass Interchange at MP 63 constrains the road profile, which affects vertical clearances achievable on either side of the interchange. Raising the interchange is not a favorable option because it would require increasing the profile and footprint of the adjoining roadways (Kachess Lake Road and FS Road 54) and increases impacts to nearby forest and wetlands. We also recognized that private property ownership north of I-90 presented a high risk of human use and incompatible land use with our wildlife connectivity investments in this location.

The Stampede Pass Interchange and nearby private property precluded us from locating a large structure between MP 62.6 and 63.4. Under these constraints, it was not possible to meet functional equivalence within just the Swamp Creek CEA. There were fewer constraints with the highway profile within the Toll Creek CEA (MP 63.5 to 64.2) and it is within the same wildlife linkage zone as Swamp Creek.

The Selected Alternative design within the Swamp and Toll Creek CEAs included 120-foot bridges at MP 62.5, 62.7, 63.2, and 63.7 equaling 480 feet of bridge length. Our recommendation for these structures consists of 200 foot bridges at MP 62.5, 80 foot bridges at Swamp Creek (MP 62.7), and 200 foot bridges at MP 63.7 that still equals 480 feet of bridge length. Both options provide four large structure equivalents with a total of 480 feet of bridge.

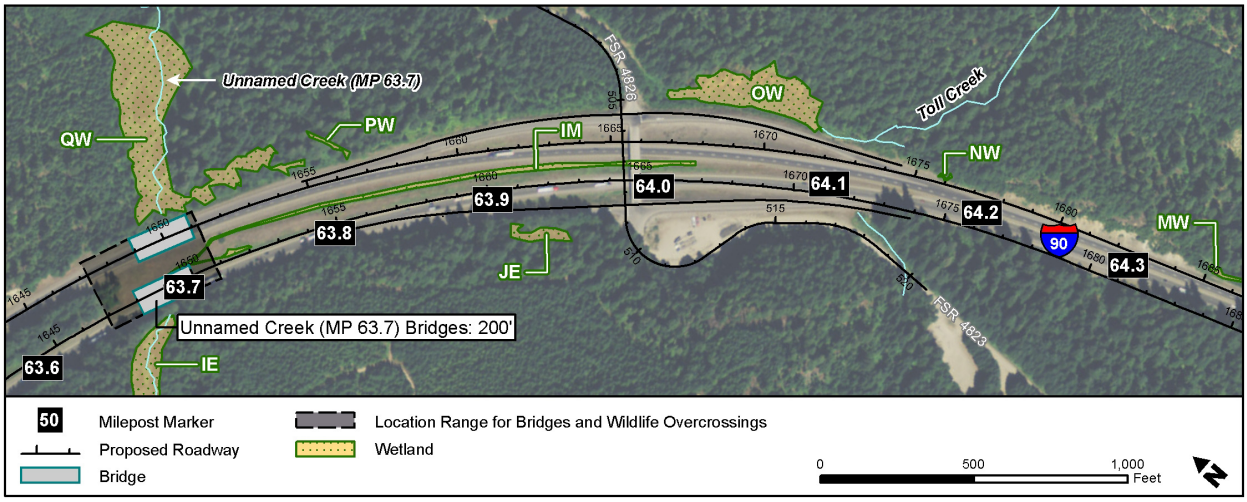
As part of our review we also discussed that fitting a 120 foot bridge structure in Swamp Creek would result in excavation through a natural glacial outwash feature and be inconsistent with USFS Riparian Reserves and Aquatic Conservation Strategy objectives. The 80-foot bridges accommodate the Swamp Creek 100-year flood and reconnect wetland habitats, and we are can still meet our connectivity objectives for high-mobility wildlife with the neighboring 200 foot structures at MP 62.5 and MP 63.7.

Other options considered

Other proposals we discussed that failed to meet functional equivalence within the Swamp and Toll Creek CEAs included:

1. Construct 180 foot bridges at MP 62.5, 120 foot bridges at Swamp Creek, and 180-foot bridges at MP 63.7.
2. Construct 240 foot bridges at MP 62.5, a culvert at Swamp Creek, and 180 foot bridges at MP 63.7.

Toll Creek CEA



The Toll Creek CEA is located between MP 63.5 and 64.2, and has the potential to reconnect species associated with mature forest habitats. The Selected Alternative included EB and WB 120 foot bridges at MP 63.7, spanning the unnamed creek at this location, with at least 16 feet of vertical clearance.

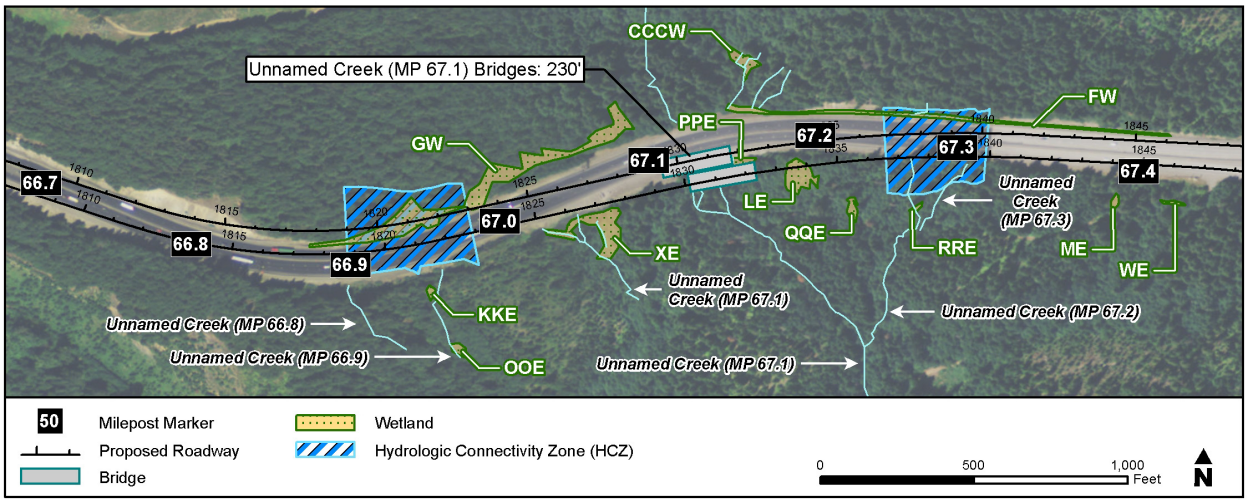
Recommendation

Our recommendation for Toll Creek is to construct 200 foot bridges at MP 63.7, with 14 to 16 feet of vertical clearance. The increase in bridge length accounts for the reduced bridge length at Swamp Creek and removal of the proposed bridges at MP 63.2. We will continue to work to maximize vertical clearances under bridges as designs progress.

Rationale

Refer to Swamp Creek CEA for a discussion of the rationale for our recommendation. The proposed 200 foot bridge in the Toll Creek CEA (MP 63.7) is approximately 0.5 miles east of the Swamp Creek CEA.

Hudson Creek CEA



The Hudson Creek CEA is located between MP 66.8 and 67.3, and provides the best opportunity in the project area to provide connectivity for species associated with talus habitat. The Selected Alternative included EB and WB 230 foot bridges at MP 67.1, spanning the unnamed creek at this location, with at least 16 feet of vertical clearance.

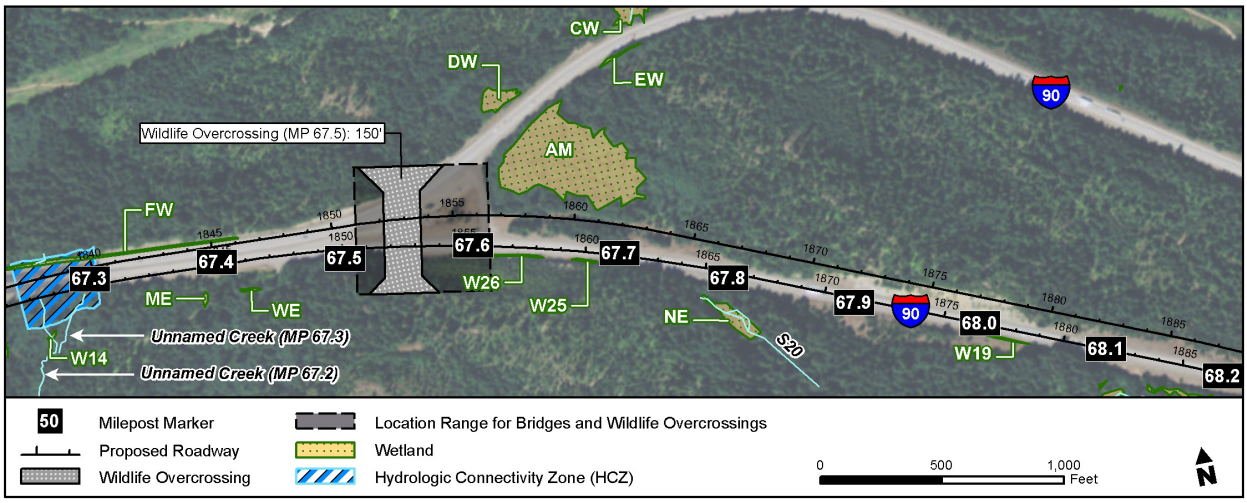
Recommendation

Our recommendation for Hudson Creek CEA matches the Selected Alternative: construct EB and WB 230 foot bridges at MP 67.1, spanning the unnamed creek at this location, with at least 16 feet of vertical clearance.

Rationale

We did not identify any constraints that would require changes to the structure type, size, or location at Hudson Creek CEA. Current designs suggest that the vertical clearance under this structure will exceed that of the structure in the selected alternative. We expect increased vertical clearance to improve the performance of this structure in terms of meeting connectivity objectives. Increased clearance may enhance development of natural vegetation under the bridges, improving performance for low-mobility species, and increased openness may accommodate preferences of more species of wildlife and result in lower repulsion rates for high-mobility species.

Easton Hill CEA



The Easton Hill CEA is located between MP 67.3 and 68.0, and provides critical wildlife linkage between high-quality habitats associated with the roadless areas south of I-90 to roadless areas located between Kachess Lake and Lake Cle Elum, which in turn link to the Alpine Lakes Wilderness. The Selected Alternative design was based on the split highway alignments at Easton Hill, and included EB and WB 120 foot bridges at MP 67.6 with at least 16 feet of vertical clearance.

Recommendation

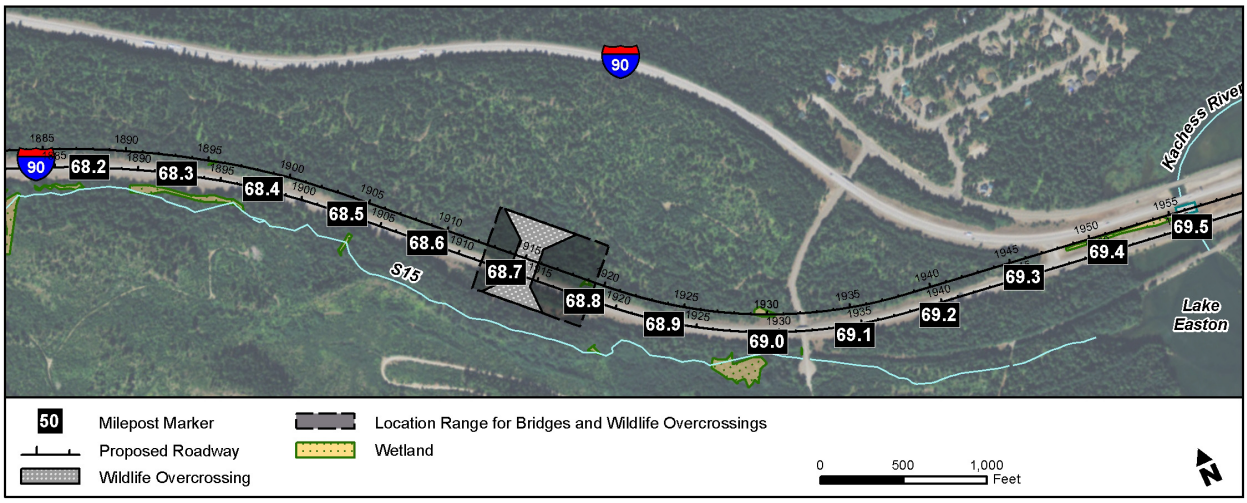
Our recommendation is to bundle the EB and WB alignments at Easton Hill, and construct a single 150 foot wildlife overcrossing near MP 67.6, spanning EB and WB lanes.

Rationale

The split alignments at Easton Hill, coupled with the area topography, result in challenges for meeting wildlife connectivity objectives within the Easton Hill and Kachess River CEAs. A split roadway also poses a challenge for the design and installation of wildlife exclusion fence. Either a fence corral would be needed across the median between the EB and WB structures, or both sides of each alignment would need to be fenced, doubling the total fence length. Bundling the alignments helps solve these issues.

The highway profile at MP 67.6 will not accommodate the bridges included in the Selected Alternative; however, the topography on either side of the highway lends itself to an overcrossing. The wide-ranging species that use this area also tend to use overcrossings more readily than bridges. Our expectation is that the proposed overcrossing will perform better than the bridges in the Selected Alternative in terms of meeting wildlife connectivity objectives. This expectation is based not only on the species present in this CEA, but also because the bundled alignment should provide a more efficient and effective crossing opportunity for wildlife. Solutions for meeting hydrologic connectivity objectives in this CEA still need to be developed.

Kachess River CEA



Kachess River CEA is located between MP 68.3 and 69.6, within a north-south trending habitat corridor from the Silver Creek drainage (east of Kachess Lake), around the south end of Kachess Lake, crossing I-90 west of the Kachess River, and then trending toward the southwest. The Selected Alternative was based on the existing split EB and WB highway alignments at Easton Hill, and included EB and WB 150 foot overcrossings at approximately MP 68.5 and MP 68.4, respectively.

Recommendation

Our recommendation is to bundle the EB and WB alignments at Easton Hill, and construct a single 150 foot wildlife overcrossing near MP 68.7, spanning EB and WB lanes.

Rationale

The primary difference between our recommendation and the Selected Alternative design is the decision to bundle alignments. The advantages of alignment bundling are discussed under the Easton Hill CEA. Our expectation is that the proposed overcrossing will perform better because the bundled alignment should provide a more efficient and effective crossing opportunity for wildlife.

The location of the overcrossing was shifted to the east because the topography on either side of the highway at MP 68.7 is somewhat better suited.

Next Steps

We will follow the steps identified in **Exhibit 3** to progress from the current design recommendations to a constructed project.

Exhibit 3. I-90 Project Steps to Completion

Summer 2015
IDT field tour of the remaining project area
State legislature approves design and construction funding
Fall 2015
WHET Committee presents decision point #1 recommendations to the IDT (this document)
WSDOT incorporates addition survey for the remainder of the project and begins analyzing resource impacts
WSDOT develops project phasing and path forward to deliver the project
WHET Committee considers additional decision points related to Hydrologic Connectivity Zones (HCZs), habitat, and stream crossing options
Winter 2016
WSDOT continues to seek IDT input and work on 30 percent designs
WSDOT begins to scope regulatory requirements to advance the project (NEPA, ESA, 404, 401, etc.)
2016 (to be determined)
WSDOT and IDT continue to review project updates, avoidance, minimization, conservation efforts
WSDOT begins to updates NEPA documentation & seek IDT input of ecological connectivity decision points
WSDOT works toward 30 percent project designs
WSDOT continues to provide updates to IDT